Results: % Retention n = 4 experiments per intervention; time in minutes, τ = shear rate in dynes/cm^2

Time	0	5	15	30	60	120
$\tau = 5$	100	98 ± 0.1	92 ± 2.0	91 ± 2.1	88 ± 1.3	96 ± 1.1
$\tau = 15$	100	96 ± 2.8	90 ± 4.8	85 ± 5.4	80 ± 6.8	71 ± 4.5
$\tau = 30$	100	92 ± 3.6	86 ± 5.8	83 ± 4.3	78 ± 2.3	67 ± 6.8

I^{125} -labeled anti-fibrinogen conjugated liposomes attached to fibrin and remained attached in large quantities under all flow conditions. Raising the water temperature to 37ºC or use of plasma did not alter liposomal retention. Echogenic liposomes can attach to their target sites and remain attached under flow conditions for ample time to allow for ultrasonic imaging.

1094-47 Three-Dimensional Echocardiography Improves Accuracy and Reproducibility of LV Ejection Fraction Estimates by an Inexperienced Reader

T. Chow, M.L. Chuang, R.A. Beaudin, M.F. Riley, P.S. Douglas, M.G. Hibberd. *Beth Israel Hospital, Boston, MA, USA, Hewlett-Packard Company, Andover, MA, USA*

Transthoracic three-dimensional echocardiography (3DE) has been shown to measure left ventricular systolic function accurately. We hypothesized that a "freehand" electromagnetic plane-positioning 3DE system, which explicitly displays the spatial relationships between multiple image planes, and permits use of non-standard planes (thus allowing images to be optimized for endocardial border definition) would improve the ability of an inexperienced reader to measure LV ejection fraction. *Methods:* Paired 3DE and 2DE studies on 16 patients were analyzed by two expert (E1, E2) readers and one novice (N). The novice was a third-year medical resident without prior experience in echo. For 3DE, diastolic and systolic endocardial contours from 16–20 different views were traced by each observer. LV volumes and EF were calculated by fitting a minimum-energy surface to traced borders. A modified Simpson's method was applied to apical 4C images for quantitative 2D EF. All echo results were compared to breathhold ciné MRI EFs by linear regression and Bland-Altman analyses. *Results:*

Echo vs MRI EF	3D (E1)	3D (E2)	3D (N)	2D (E1)	2D (E2)	2D (N)
r^2	0.99	0.98	0.93	0.90	0.85	0.85
SEE (%)	2.8	2.3	6.1	6.0	8.9	13.1
Bias (%)	−1.3	−1.0	6.0	1.5	−4.3	−7.5
95% Conf. Int.	6.2	4.6	12.6	16.0	18.4	24.4

Conclusions: Expert readers obtained more accurate EFs by both 3DE and 2DE compared to the novice. However, novice 3DE variability was comparable to expert 2DE. This is in part because the 3DE system allows use of any image plane and partial contours, permitting selection of easily identified endocardial border segments for 3DE analysis. Thus 3DE partially compensates for reader inexperience in measuring LV ejection fraction.

1094-48 Dynamic 3-Dimensional Transthoracic Echocardiographic Evaluation of the Total Mass of the Left Ventricle Using Three Different Myocardial Tissue Encoding Techniques

J. Azevedo, M. Garcia-Fernandez, P. Puerta, M. Moreno, J. Vallejo, J.L. Delcan. *Laboratorio de Ecocardiografia, Servicio de Cardiologia, Hospital General "Gregorio Marañon", Madrid, España, Spain*

Dynamic transthoracic (TTE) three-dimensional echocardiography (3-DE) is a new method that evaluates with a high accuracy several structural and functional parameters of the LV, including the total LV mass (LVM/g). Color Doppler tissue imaging (DTI) of the LV myocardial wall is a recently developed non-invasive technique that delineates the LV myocardial wall based on tissue motion velocity, with a lower attenuation coefficient from the chest wall. The purpose of our study was to apply three different myocardial tissue encoding techniques of the left ventricle, including the conventional ultrasound gray scale (3-DE), the new color DTI technique (3-DTI), and the gray scale conversion of the color DTI (3-DTG) in a common computerized process of dynamic 3-D reconstruction, to obtain and display 3-DE images of the LV, and to calculate the total LVM. Using an apical TTE approach, the LVM was calculated using the 3 different methods (3-DE, 3-DTI and 3-DTG) in a clinical setting, during TTE routine studies of 20 pts with a variety of cardiac disorders. To do so, the original 2-DE images were transferred to a computer with a 3-DE software based on a polyhedral surface algorithm. The LVM was calculated using two endocardial and epicardial contours and volume calculation. The difference between the endocardial and epicardial volumes gives the LV wall volume. The LV mass is obtained multiplying the LV wall volume by a factor k = 1.4. The inter-methods (% Var), intra- and inter-observer variabilities (Var/%) for the three different myocardial tissue encoding techniques are showed in the following chart:

	3-DE	3-DTI	3-DTG	% Var	p Value
Total LV Mass	196 ± 23	179 ± 20	167 ± 18	14.7%	ns
Intra Observer Var	7.6%	9.2%*	5.1%	–	*0.02
Inter Observer Var	11.4%	14.6%**	7.2%	–	** 0.01

The calculation of the LV mass can be performed using the combination of three-dimensional echocardiography with the new color Doppler tissue imaging technique of the myocardial wall. Among the different myocardial wall encoding techniques available, the gray scale conversion of the color DTI images, with a better endocardial and epicardial resolution, registered the lowest values for the indices of variability of this structural parameter.

1094-49 Longitudinal Rotational Tomographic Approach for In Vivo Determination of Left Ventricular Mass – Comparison of a New Three-Dimensional Echocardiographic Method to Anatomy

D. Lama, J. Yao, N. Masani, C. Laskari, T. Bartel, S. Muller, Q.-L. Cao, D. Galzerano, N. Pandian. *Tufts-New England Medical Center, Boston, Mass, USA*

We examined the accuracy of a new approach (longitudinal rotational tomographic analysis) in 3-D echocardiographic (3DE) determination of LV mass in vivo and compared it with transverse tomographic method. In 8 dogs, we imaged the heart using rotational scanning and 3DE data sets were acquired for voxel-based 3DE. After imaging, true anatomic LV mass (M) was measured postmortem by weighing the heart. In blinded 3DE analysis, LV myocardium was contoured in equiangled longitudinal (L) sections (every 10, 20 and 30 degrees), myocardial area measured automatically, and slice volume computed. Cumulative volume of the slices multiplied by tissue density yielded LVM. In addition, LVM was also computed using short-axis (S) slicing (every 5, 10, and 20 mm) approach. The 3DE data were compared to true anatomic M measurements. *Results (mean ± SD):* True M was 95.5 ± 11 gms. LVM by all 3DE analysis methods was similar to true LVM except with S 20 mm and L 30 intervals.

Methods:

	S5	S10	S20	L10	L20	L30
r	0.98	0.97	0.57	0.96	0.88	0.28
p	< 0.0001	< 0.0001	NS	< 0.0001	< 0.005	NS

Mean difference (Bland-Altman) was smallest (less than 1.6 gms) with S5, S10 and L 10 methods. *Conclusion:* Longitudinal tomographic analysis provides a new and reliable method to measure LV mass in vivo by 3DE and compares well with transverse tomographic technique. Longitudinal tomographic approach could be particularly useful when apical slice measurement is difficult by transverse tomographic method.

1094-50 Three Dimensional Ultrasonic Imaging of Femoral Arterial Pseudoaneurysms

R.M. Applebaum, I. Kronzon, M.J. Attubato, F. Feit. *NYU Medical Center, NYC, NY, USA*

Iatrogenic femoral pseudoaneurysms (IPA) are a common complication of cardiac catheterization and interventional endovascular procedures. Femoral duplex study is the method of choice for diagnosing this condition by demonstrating the IPA, the femoral artery (FA) and the communicating tract between the FA and the IPA. Duplex also shows the characteristic blood flow into the IPA (in systole) and back into the FA (in diastole). Because of the complex anatomy, we used 3D/4D imaging to evaluate IPA in eight pts. The maximal IPA diameter was 1.5–4.5 cm (mean 2.3 ± 0.7). The length of the communicating tract was 0–3.2 cm (mean 1.1 + 1.0).

With the transducer placed on the skin just above the FA, 3D/4D images were obtained with and without color flow mapping. 3D/4D images were superior to the conventional Duplex study in that they better demonstrated the complex shape of the IPA and its relation to the femoral artery and vein. It also better imaged the exact direction, site and angle of entry and size of the communicating tract. When clot was present (4pts), 3D better demonstrated its extent within the IPA. The direction and the amount of the blood flow within the IPA and the communication tract was clearly demonstrated.

Conclusion: 3D/4D non-invasive evaluation is an adjunct to the ultrasound evaluation of an IPA.